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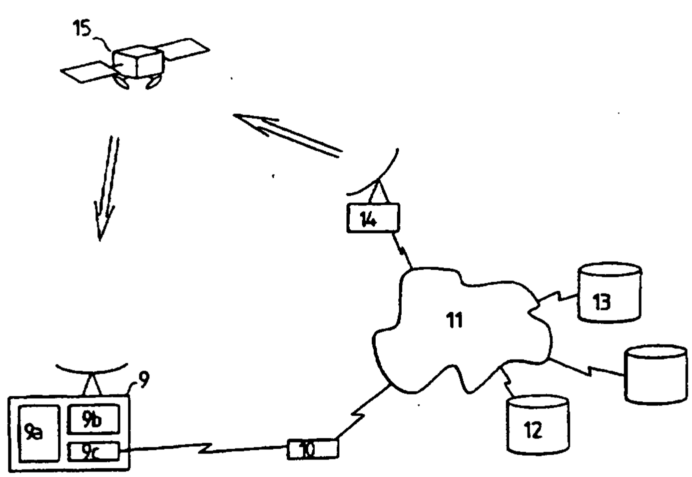

(57) Abstract

The invention relates to a system for organising fast data links using means designed for other data transmission methods. According to the invention, data intended for a given receiver (9) is transmitted from a given transmitter (13) as packets (6, 8) consistent with a network protocol over a data network (11) to a transmitting station (14), which multiplexes the packets into a digital transport stream (1) generated by it, marking those parts (2) of the transport stream that relate to said packets with a part (3) of the address of the receiver. The network protocol is preferably the TCP/IP protocol and the transport stream is preferably an MPEG system transport stream. The TCP/IP address of the receiving device (9) is dynamically allocated for this purpose from the address server (12) of the network, so the address is a temporary one and becomes available for reuse as soon as the transmission has been completed. Preferably the TS packets (2) in the MPEG system transport stream (1) that contain data intended for a given receiver are marked by setting their PID identifier (3) to be equal to 13 low-order bits of the temporary TCP/IP address of the receiver.

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Packet switching system using telephonic and satellite transmission

In general, the invention relates to a procedure for establishing fast Internet-type connections between transmitter and receiver and especially for utilising fast data transmission systems designed for other purposes in such connections. The invention also relates to the use of dynamically allocated network and device addresses in this type of connections. An 'Internet-type connection' refers in this context to a communication link through which it is possible to transmit data in an extensive data network over large distances regardless of the actual physical routing within the network.

In the use of the Internet communication network and other corresponding data transmission systems, there is a need to increase the data transmission speeds from the present level. In this context, 'data transmission' refers especially to data transfer between computers over distances that may be several thousand kilometres. The user wants fast network connections for home use in the future. If a data link applicable for fast data transmission is to be made available to homes, it will be necessary to consider, on the one hand, how to ensure a sufficient service level, and on the other hand, how to minimise the need to build new cable, remote mobile switching unit and routing systems. Moreover, it is to be expected that in future communication systems the terminal equipment must be provided the same kind of independence of the environment and freedom of movement as mobile telephones in modern cellular networks already have. A special problem is that the number of fixedly determined 32-bit Internet addresses of the type currently used is, for reasons associated with their definition, approaching the theoretical maximum. For this reason, some sort of a dynamic approach to addressing has to be introduced. This is to say that a given address is available for use by a device connected to the network only for the time the device is active and needs a communication connection via the network. When the device exits the network, the same address can be assigned to another device.

In prior art, a solution called the DSM-CC (Digital Storage Media Command & Control) method is known, in which packets consistent with a given network standard, e.g. TCP/IP packets (Transmission Control Protocol / Internet Protocol), are transmitted in a system transport stream (System TS / Transport Stream) consistent with the so-called MPEG standards (Moving Picture Experts Group). To elucidate this solution and also the background of the present invention. data transmission according to the MPEG standards will be described first.

The generally known MPEG standards define an arrangement designed for the transmission of real-time information, especially compressed video in a digital form. In general terms. a data stream transmitted in accordance with the MPEG standards. a so-called transport stream (TS), is a bit stream consisting of successive packets of a certain length. Fig. 1 illustrates a transport stream 1 consisting of TS packets 2. The transport stream 1 can be transmitted e.g. via a satellite, in which case it will be accessible to a very large number of receivers. The length of a TS packet 2 is 188 bytes, of which the first four bytes form the packet header 2a while the rest or 184 bytes comprise the payload 2b, i.e. the actual data to be transmitted. Each part of the header has a definite significance. From the point of view of the present invention. the most important part is the packet identifier 3 (PID, Packet IDentifier), hereinafter referred to as the PID identifier or simply as PID. Its length is 13 bits.

Via a single transport stream it is possible to transmit several programmes or other logical entities simultaneously. Following the established practice, these are called programmes in this description. In practice, the programmes are multiplexed into the transport stream by generating from the content of each programme a packetised elementary stream or PES stream 4 (Packetised Elementary Stream), consisting of PES packets 5. A PES packet comprises a separate header part 5a and a payload part 5b of max. 64 kilobytes. Large PES packets are divided into several transport stream packets or TS packets 2 in such a way that a given programme can use either the entire transport stream capacity, in which case all TS packets contain data related to

the same PES stream 4, or the programme can use only part of the capacity, in which case some of the TS packets belong to a different PES stream. The identifiers or PIDs of the TS packets are so set that a given 13-bit PID will unambiguously refer to a certain PES stream. Since a programme transmitted via a PES stream only lasts for a certain time, at the end of that PES stream the PID used to point to it will become available for use as an identifier pointing to another PES stream about to be started. Certain TS packets in the transport stream carry so-called programme data, indicating the PES stream that the PIDs currently used relate to. As the PID identifier comprises 13 bits in the packet headers or the transport stream, the number of different programmes that can be pointed to at a time is in principle 8191. In practice, certain PIDs are reserved for special uses in the MPEG standards, so the number of programmes that can be pointed to at a time is somewhat lower than this.

A receiver device designed for the reception of a transport stream consistent with the MPEG standard comprises a decoder which is capable of handling individual TS packets and deciding on the basis of their PID identifiers which packets belong to which PES stream and thus to a given programme. If the receiver is used for the reception of only a given programme at a time, it will reject any TS packets related to all other programmes and construct the original programme from the content of the packets marked with a given PID. Moreover, in this system it is possible to encrypt the TS packets belonging to each PES stream by using an encryption key specific to the particular PES stream, in which case the receiver will only be able to decipher and present a programme transmitted via a given PES stream if it knows the corresponding disencryption key.

In the above-mentioned solution representing prior art, defined in ISO/IEC (International Standard Organisation / International Electrotechnical Commission) draft standard 13818-6, a certain data stream multiplexed into the same transmission with PES streams is used to implement network connections via satellite. In the system, data traffic intended for individual receivers, i.e. packets to be sent to terminal equipment identified by a given address (e.g. an IP address), are placed in so-

called Private Tables (Private Section), whose maximum length is 4093 bytes. At the multiplexing stage, the private tables are taken to be analogous to system tables marked with a given PID identifier. Examples of system tables are the PAT. CAT and PMT tables defined in the above-mentioned standard.

A prior-art arrangement is illustrated by Fig. 3. At the top is a TCP/IP packet 6, which comprises a 20-byte IP header 6a, a 20-byte TCP header 6b and a payload part 6c. In the first phase of a transmission according to draft standard 13818-6, a CC header 7a is added to the TCP/IP packet, thus forming a packet 7 consistent with the DSM-CC packet definition. The purpose of this operation is to render the arrangement independent of the header usage observed in a given network protocol (in this figure, the TCP/IP protocol). After this, the packets of the type of packet 7, intended for a certain receiver, are further placed in private tables 16 consistent with standard 13818-6, and these are provided with a table header 16a and divided during multiplexing into TS packets 2 in a transport stream 1, each TS packet comprising a PID identifier in its header 2a as described above. Generally, there is one PID identifier corresponding to each table type (PAT, CAT,PMT, Private, etc.), indicating the type of data contained by the tables.

However, the solution described above is very awkward because the receiver device designed for the reception of an MPEG stream must first interpret all private tables, then divide them into DSM-CC packets and further into TCP/IP packets and finally examine each TCP/IP address to find out whether the data packet in question is intended for this particular receiver (or rather the computer connected to it). The whole chain of interpreting actions must be performed by software in a given processor, involving a considerable computing load. Besides, the data packets cannot be effectively encrypted. The solution does not provide any relief to the problem referred to above, relating to a shortage of Internet addresses.

The object of the present invention is to produce a data transmission method that can be used to set up fast connections in a world-wide data network. Another object

of the invention is to enable data transmission modes designed for other purposes to be utilised in such connections. A further object of the invention is that the use of the proposed procedure should require only minor hardware changes as compared with existing equipment. An additional object of the invention is that the proposed procedure should not impose an excessive load on the computing capacity of the equipment involved in the data transfer, and that data transmitted by this method should be easy to encrypt.

The objects of the invention are achieved by packing the packets consistent with a network protocol into packets of a digital transport stream and by using a part of the address of the receiving equipment as a packet identifier in the digital transport stream. Moreover, to achieve the objects of the invention, this address is dynamically allocated for this use, so that when a given data transmission comes to an end, both the address and the transport stream packet identifier will become available for use by others.

The procedure of the invention for transmitting data from a transmitting device connected to a data network via the data network and a transmitting station to a receiving device is characterized in that it comprises stages in which

- from the information to be transmitted, a given transmitting device forms packets consistent with the network protocol observed in the data network concerned, comprising the address of a given receiving device,
- said packets are transferred via the data network to the transmitting station,
- the transmitting station multiplexes the data stream formed by these packets into a digital transport stream generated by it, marking the parts of the digital transport stream related to said packets with a part of said address of the receiving device,
- the transmitting station transmits the digital transport stream it has generated, which digital transport stream can be received in a coverage area comprising a plurality of receivers, and
- said receiving device receives said digital transport stream and interprets those

parts of it that are marked with said part of the address of the receiving device.

The invention also relates to an apparatus for implementing the procedure of the invention. The apparatus of the invention is characterized in that it comprises

- means in said transmitting device for forming packets consistent with the network protocol observed in said data network and providing them with the address of the receiving device, as well as means for transmitting said packets into said data network,
- means in said transmitting station for receiving said packets from said data network and means for multiplexing the data stream formed by these packets as a part of said digital transport stream. as well as means for decoding the receiver address associated with said packets and for marking those parts of the digital transport stream that relate to said packets with a part of said address, and
- means in said receiving device for receiving said digital transport stream and interpreting the parts marked with a part of said address.

In the procedure of the invention, certain packets in a packet-mode digital transport stream are reserved for information to be sent directly to the receiver identified by a certain address. In this case, the packet identifier to be used is a part of the receiver's address. which has been dynamically allocated for data transmission. In the following description of the invention, the transport stream used as an example is an MPEG system transport stream (MPEG System TS) and the network protocol observed to organise and address the data to be transmitted is the TCP/IP protocol. On certain conditions to be explained later on, the invention can be extended to cover other transport streams and network protocols as well. Moreover, it is assumed in the description as an example that the parties involved in the data transfer are a certain transmitting device which is stationary and has a permanent Internet address and a certain receiving device which may be mobile and has no permanent Internet address.

In the system of the invention, the receiving device starts the communication by

sending e.g. via modem a request for an Internet address or a so-called dynamic address allocation request to a given server connected to the Internet network. The server, which can be called an address server, assigns a free 32-bit Internet address to the receiving device. After this, via a modem line or a corresponding data transmission line and/or other connections used in the data network, the receiving device sends a request to the transmitting device to start transmission. This request contains the above-mentioned temporary Internet address of the receiving device. The transmitting device sends the requested data over a fast network connection to a transmitting station, whose normal function is to transmit e.g. a broadcast or television transmission type MPEG transport stream in a known manner. The transmitting station multiplexes the data intended for the receiving device into the transport stream so that the data is placed in private tables, which are divided into certain TS packets, whose PID identifier is formed from 13 low-order bits of the temporary Internet address of the receiving device. If the data is to be encrypted, the transmitting station must know which encryption key is to be used for the encryption of data intended for this particular receiver, in which case all TS packets sent to this receiver are encrypted with the appropriate key.

The transmitting station transmits the transport stream e.g. via a satellite, in which case it can be received in the whole coverage area of the satellite. The receiving device, which has been monitoring the transport stream transmitted via this satellite since it sent a request to start transmission, recognises the TS packets intended for itself by the PID identifier, disencrypts the data if encryption is used, and reconstructs the data transmitted. Once all the transmitted data has arrived in the receiving device, the latter sends via the modem line an acknowledgement to the address server, thereby releasing the temporary Internet address, which can then be assigned further to another device. An acknowledgement is not necessary if the temporary Internet address has been assigned to the device for a certain length of time.

The possibility of multiplexing Internet-type data transfer into a transport stream consistent with the MPEG standards is based on the fact that the transport stream is

seldom so fully reserved that its entire bandwidth is in use. As an example. let us consider a transport stream whose useful bandwidth is 40 Mbit/s. In a typical situation. the transport stream carries e.g. five compressed video images, each of which occupies a bandwidth of 5Mbit/s. In this case, there will be 15 Mbit/s of the total useful bandwidth left over, so this remaining bandwidth can be assigned for temporary data transfer connections. It is conceivable that the procedure of the invention can be applied e.g. in cases where the user of a receiving device contacts the client server of a given software supplier to download a new software version. For the transfer of a file of several megabytes. e.g. a bandwidth of 2 Mbit/s is reserved from the transport stream, but as the transfer only takes a few tens of seconds. the same capacity can soon be assigned to another connection.

In the following, the invention is described in detail by referring to preferred embodiments presented as examples, as well as to the attached drawings. in which

Fig. 1 presents a known transport stream composition.

Fig. 2 illustrates known programme transmission as a PES transport stream in accordance with the MPEG standard,

Fig. 3 illustrates a prior-art procedure for the use of an MPEG transport stream to transmit data to an individual receiver,

Fig. 4 illustrates the procedure of the invention for the use of an MPEG transport stream to transmit data to an individual receiver. and

Fig. 5 illustrates a data transfer system in which the procedure of the invention can be used.

In the above description of prior art, reference was made to Fig. 1 – 3, so in the following description of the invention and its preferred embodiments, Fig. 4 and 5 will

be referred to in the first place. In the figures, corresponding parts are identified by the same reference numbers.

Fig. 4 illustrates the way in which data organised and addressed according to the TCP/IP protocol is transferred by the method of the invention using an MPEG transport stream. At the top of the figure there is a TCP/IP packet 6, which consists of a 20-byte IP header 6a, a 20-byte TCP header 6b and a payload part 6c, which may have a length of 180, 178 or 163 bytes. The IP header 6a contains, among other things, the receiver's network address (not shown separately in the figure), whose length is 32 bits. To ensure that the invention is not dependent on any protocol, first a DSM-CC packet 7 is formed by adding a DMS-CC header 7a to a packet consistent with the network protocol (in this case TCP/IP). Further, from this packet 7 a private table 16 is formed, which comprises a table header 16a and has a length equal to the sum of the lengths of the packet 6 consistent with the network protocol, the DSM-CC header 7a and the table header 16a. From the address 6a of the packet consistent with the network protocol, as many of the low-order bits of the receiver's address are included in the table header 16a as there are bits available in the transport stream for the identification of TS packets. In the embodiment presented in the figure, the length of the PID identifier is 13 bits, so the private table header 16a will contain 13 low-order bits from the IP address 6a. The table is divided according to standard 13818-6 into payloads of TS packets 2 and the 13-bit PID identifier 3 in the header part of each TS packet is set to be equal to the 13 last or low-order bits of the 32-bit IP address of the TCP/IP packet to be transmitted.

Fig. 5 presents a diagram representing the equipment and systems involved in data transmission applying the procedure of the invention. The receiving device 9 comprises at least a computer 9a and a receiver 9b capable of interpreting an MPEG transmission known in itself. The receiver 9b may be e.g. a so-called Set Top Box (STB) designed for the reception of ordinary television programmes, and its technical implementation is in itself known to a person skilled in the art. The computer 9a is the actual receiver of the data transmitted, and its central processing unit (not

shown separately in the figure) controls the operation of the whole receiving device 9. A special advantage of the invention is observed in the fact that the demultiplexing chip (not shown separately in the figures) of the receiver 9b can identify and sort out the TS packets intended for the receiving device quickly and effectively based on the component (hardware) implementation, so it is not required to have a high computing capacity.

The receiving device also comprises a modem 9c or an equivalent adapter device applicable for relatively slow network connections. In the embodiment presented in Fig. 5, all communication from the receiving device 9 takes place via a modem 9c. In a manner known itself, the modem 9c is connected e.g. via a conventional circuit-switched telephone network to another modem 10, which in turn is connected to a packet-switched data transmission network 11 consisting of servers interconnected via mutual data links. Of the servers connected to the network, the figure shows particularly the address server 12, whose function is to assign dynamically allocated IP addresses to different users and to maintain a database of information as to who owns which address at any given time. The address server 12 is a computer in which the allocation of addresses and the maintenance of the database are performed e.g. in accordance with the DHCP protocol (Dynamic Host Configuration Protocol) known in itself. In its present form, this protocol comprises dynamic allocation and maintenance of TCP/IP addresses in the first place, but it can be extended so as to enable it to handle addresses consistent with any known protocol.

In the arrangement presented in the figure, it is assumed that the internal connections within the data transmission network 11 are capable of very high transfer speeds, even several tens of megabits per second. The transmitting device 13 is a computer which is connected to the data network 11 and comprises the network protocol means (not shown in the figure) known in themselves that are used to form successive TCP/IP packets from the data to be transmitted. Other servers (not shown in the figure) connected to the network comprise means known in themselves for routing the TCP/IP packets in the network in a hierarchic manner such that the most

significant bits in the packet addresses will determine the routing at the network level.

Connected to the data network 11 is also a transmitting station 14, which, like a conventional transmitting station, comprises means for multiplexing the programmes proceeding from different sources into one or more transport streams or MPEG System TS streams. To implement the procedure of the invention, the transmitting station 14 also comprises means for receiving TCP/IP packets, adding the DSM-CC headers and forming private tables and placing them in the TS packets of the transport stream. The means receiving TCP/IP packets are connected to the means forming the transport stream via a link used to transmit the 13 low-order bits of the TCP/IP packet addresses, to be used as PID identifiers of the TS packets.

In the embodiment presented in Fig. 5, the system comprises a satellite 15, which transmits the transport stream from the transmitting station to the coverage area of its transmitting aerials. For the use of the procedure of the invention, it is not necessary for the satellite to have any special additional equipment or functions besides normal hardware applicable for MPEG transmission. Most new broadcasting and television satellites are capable of transmitting a transport stream of the MPEG format. However, from the point of view of the invention, the medium used to transmit the transport stream from the transmitting station 14 to the receiving device 9 is not an essential question. Instead of a satellite, the transmission may take place e.g. via a cable television network or a communication network between computers. Even when a satellite is used for the transmission, the apparatus of the invention preferably comprises, like conventional equipment for television transmissions, a local satellite receiver and a local cable network (these are not shown in the figure) to carry the transmission further to homes.

In another embodiment of the invention, the information is transmitted in the data network 11 and from the transmitting station 14 in an encrypted format. The encryption can be implemented by any known method. As the MPEG definitions in-

clude programme-specific encryption, which means that all TS packets marked with a given PID identifier are encrypted using a certain encryption key, this operation can be utilised in the system of the invention. If the so-called Public Domain Key encryption is used, then the transmitting station 14 is provided with storage means for the storage of the receivers' public domain keys. The address server 12 informs the transmitting station 14 about the PID corresponding to each receiver, and the transmitting station encrypts all TS packets marked with a certain PID using the public domain key of the receiver concerned.

The use of an address dynamically allocated to a receiving device will be described next, still focusing on IP addresses as an example, corresponding to TCP/IP format transmission in a data network 11. IP addresses have 32 bits and are divided into A, B and C types. As an example, the B-type address will be described. It comprises two bits indicating the address type, 14 bits called the network part and used for routing up to a certain so-called organisation server, and 16 bits which are unambiguous computer-specific addresses under the organisation server concerned. In the procedure of the invention, the data network 11 only handles the network part of the IP address dynamically allocated to the receiver and, based on that, directs the TCP/IP packets intended for that receiver to the transmitting station 14. Of the 16-bit computer-specific address of a B-type address, 13 bits are used as a PID identifier and three bits can be used e.g. to select a satellite channel if the satellite has eight transmission channels at most. Each transmission channel corresponds to one transport stream. If the satellite comprises more than eight channels, part of whose capacity is to be used for data transfer by the method of the invention, then it has to possess more than one B-type address range. This can be taken to mean that two or more network parts are used, both of which cause the TCP/IP packets to be routed to the same transmitting station and via it to the same satellite. In this case, the first network part corresponds to satellite channels 0-7, the second to channels 8-15, and so on.

The MPEG standards also define an alternative according to which the length of the

header part of the TS packets can be extended beyond the above-mentioned four-byte limit. In this case, it is possible e.g. to extend the PID identifier by three bits to make it 16 bits long. An extended PID will be useful in the first place in a situation where the address server receives so many address allocation requests that the 8191 possible PIDs (excluding reserved PIDs) defined with 13 bits are not sufficient to provide an address for all those who want one. There may also be other reasons to include more fields in the TS packet header than those proposed in the above description. However, the length of the payload part of the packet must not be reduced too much to avoid lowering the transmission efficiency.

The address server 12 must not assign to individual receivers temporary IP addresses whose low-order bits are already being used as the PID identifier of a programme transmitted from the transmitting station 14. The allowed address range may be fixedly determined, in which case the allowed and forbidden PID identifiers are defined in connection with the configuration of the address server 12. Another possibility is that the use of PID identifiers allocated to programmes is also agreed dynamically between the address server 12 and the transmitting station 14. In this case, two operational alternatives can be distinguished, depending on authority: If the transmitting station 14 is the authorised party, it will tell the address server which PIDs have already been allocated at any given time, in which case the address server 12 may have to immediately stop using a corresponding IP address. On the other hand, if the address server 12 is authorised to decide about the use of all PID identifiers, then the transmitting station 14 will ask for certain PIDs to be assigned to programmes, in the same way as a given IP address is temporarily assigned to individual receivers.

It is to be noted that, in the system illustrated by Fig. 5, the location of the receiving device 9 is not subject to any other requirements except that it should be located within the coverage area of the satellite 15. Reception via satellite is usually implemented in a centralised manner so that a given receiving station (not shown in the figures) receives and amplifies the signal and distributes it further via a local cable

network. The receiving device 9 may also comprise a satellite receiver of its own. in which case it will even be able to move during a communication connection as provided by the invention. The modem 9c may be wirelessly connected to another modem 10 e.g. via a mobile telephone network in a manner known in itself. In this way, the receiving device is relieved of the requirement regarding location under a certain physical organisation server that applies to conventional fixed Internet connections.

With the development of signal processing technology and the increasing use of low-orbit satellites, it may become possible to provide the receiving device 9 with a transmitter part. in which case the fast data link of the invention will become bidirectional. In this case, no modems 9c, 10 will be needed because all data is transmitted via a satellite 15.

The invention does not in itself impose any restrictions as to which network protocol is to be used to form the packets and addresses in the data network 11. For the invention, the only important point is that a certain part, preferably the so-called hardware part, of the bit string defining the address is used as a packet identifier in a digital transport stream to allow the address allocation and determination of the identifier to be carried out at the same time and to make it as simple as possible for the receiving device to sort out from the transport stream the packets intended for itself. Thus, the invention does not involve any actual restrictions as to the type of the transport stream, provided only that packets related to a given logical entity are marked using an unambiguous identifier. However, the transport stream packet identifier should preferably be shorter than the address consistent with the network protocol applied, to allow a portion of the address, corresponding to the network part as mentioned above, to be used for routing between the transmitting computer 13 and the transmitting station 14. If the packet identifier is longer, as is the case e.g. in ATM and Token Ring networks, then only a part of it is used according to the invention by setting this part so that it is substantially the same as the hardware part of the receiving device. In the embodiment illustrated by Fig. 4, it is also possible to

use longer addresses or a wider address range so that a given 13-bit PID identifier corresponds to a given user group and the remaining bits in the receiver's address, which actually identify a certain user, are placed in the so-called table_id_extension in the header part 16a of the private table 16.

Certain reception addresses can be defined in the system as broadcast-type addresses, which are used to mark TCP/IP packets (and TS packets) that are intended for all receivers or for a certain receiver group instead of a single receiver.

The procedure and apparatus of the invention for organising a fast data link can be used for fast Internet-type data transfer without any other additional equipment except a television receiver auxiliary device (e.g. a so-called Set Top Box) capable of receiving a digital transport stream (e.g. an MPEG System TS stream), which is rapidly gaining ground. Due to its dynamic address allocation system, the invention does not involve any significant load on new available Internet addresses, and the inclusion of a certain part of the address in the transport stream packet identifier guarantees that the receiving device will be able to sort out the portions intended for itself from the transport stream in an easy and light way with regard to the computing capacity required. In the procedure of the invention, the data to be transmitted can be encrypted by methods consistent with current definitions. It can be stated that the invention achieves its objects.

Claims

1. Procedure for organising the transmission of data in an extensive data network (11) comprising computer equipment (9, 12. 13) connected to it via data links and a transmitting station (14), which transmitting station comprises means for generating and transmitting a digital transport stream (1) multiplexed from a plurality of programmes, which digital transport stream to be transmitted can be received in a coverage area comprising a plurality of receivers, **characterized** in that it comprises stages in which

- a given transmitting device (13) forms from the data to be transmitted packets (6, 8) consistent with the network protocol observed in the data network concerned, comprising the address of a given receiving device,
- said packets (6, 8) are transferred via said data network (1) to said transmitting station (14),
- the transmitting station (14) multiplexes the data stream formed by said packets (6, 8) into a digital transport stream (1) generated by it, marking those parts (2) of the digital transport stream that relate to said packets with a part (3) of said address of a given receiving device,
- the transmitting station (14) transmits the digital transport stream it has generated, which digital transport stream can be received in a coverage area comprising a plurality of receivers, and
- said receiving device (9) receives said digital transport stream (1) and interprets those parts of it that are marked with said part (3) of the address of the receiving device.

2. Procedure as defined in claim 1, **characterized** in that it additionally comprises, before the stages mentioned in claim 1, stages in which

- said receiving device (9) sends to a given address server device (12) connected to the data network a request for a temporary address,

- said address server device (12) sends to said receiving device (9) data comprising a temporary address, on the basis of which the receiving device is identified in the data network (11), and
- said receiving device (9) sends to said transmitting device (13) a request to start transmission, said request comprising the temporary address,

and, after the stages mentioned in claim 1, a stage in which

- said receiving device (9) sends to said address server device (12) a message indicating that it has stopped using the temporary address.

3. Procedure as defined in claim 1 or 2, **characterized** in that communication in said data network (11) is effected in accordance with the TCP/IP protocol, in which case said address of the receiving device comprises 32 bits.

4. Procedure as defined in any one of the preceding claims, **characterized** in that said digital transport stream (1) is an MPEG system transport stream (MPEG System TS) and the TS packets in the MPEG system transport stream that contain packets (6, 8) consistent with the network protocol are marked by assigning them a PID identifier (3) consisting of certain bits included in the address of said receiving device.

5. Procedure as defined in claim 4, **characterized** in that the PID identifier (3) assigned consists of 13 low-order bits of the address of the receiving device.

6. Procedure as defined in any one of the preceding claims, **characterized** in that it additionally comprises stages in which

- in conjunction with the multiplexing, said transmitting station (14) encrypts those parts (2) of the digital transport stream (1) that are related to said packets (6, 8) consistent with the network protocol, using an encryption method specific to information intended for the particular receiver, and

- in conjunction with the interpretation, said receiving device (9) disencrypts the data intended for it.

7. System for the transfer of data between a given transmitting device (13) and a given receiving device (9), said system comprising a data network (11) and computer equipment (9, 12, 13) connected to it via data links, a transmitting station (14) comprising means for generating and transmitting a digital transport stream (1) multiplexed from a plurality of programmes, and transmission means (15) for sending the data transmitted by said transmitting station to a plurality of receivers simultaneously, **characterized** in that it comprises

- means in said transmitting device (13) for forming packets (6, 8) consistent with the network protocol observed in said data network and providing them with the address of said receiving device (9), as well as means for sending said packets into said data network (11),
- means in said transmitting station (14) for receiving said packets (6, 8) from said data network (11) and means for multiplexing the data stream formed by these packets as a part of said digital transport stream (1), as well as means for interpreting the receiver address associated with said packets (6, 8) and for marking those parts (2) of the digital transport stream that relate to said packets with a part (3) of said address, and
- means (9b) in said receiving device (9) for receiving said digital transport stream (1) and interpreting the parts marked with a part (3) of said address.

8. System as defined in claim 7, **characterized** in that it additionally comprises an address server device (12) connected to said data network (11), said address server device (12) comprising means for storing the addresses and data relating to them and for temporarily assigning addresses to given devices.

9. System as defined in claim 7 or 8, **characterized** in that it additionally comprises means in said transmitting station (14) for encrypting the data associated with given

data streams to be multiplexed. this encryption being effected in a manner specific to each data stream, as well as storage means for the storage of information relating to the encryption, and means in said receiving device (9) for the disencryption of data encrypted in a manner specific to it.

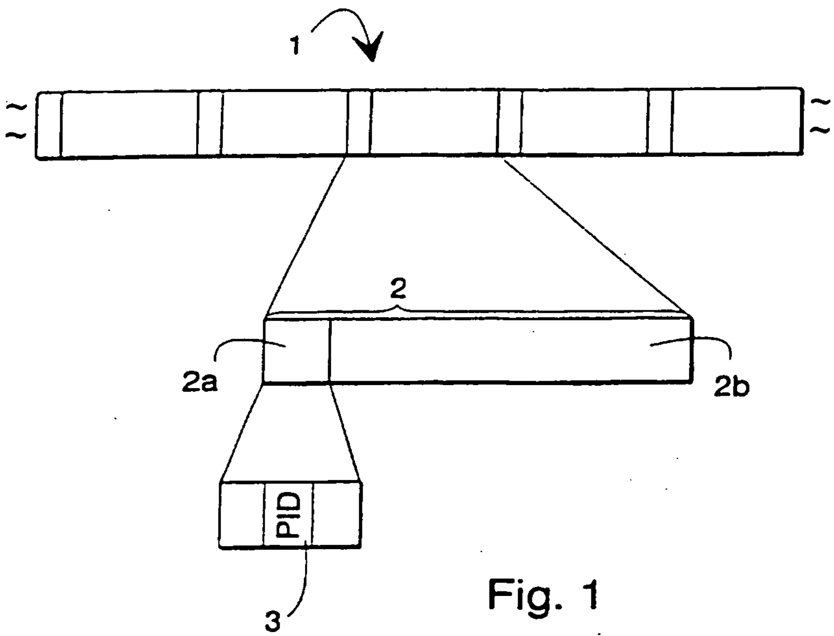

Fig. 1

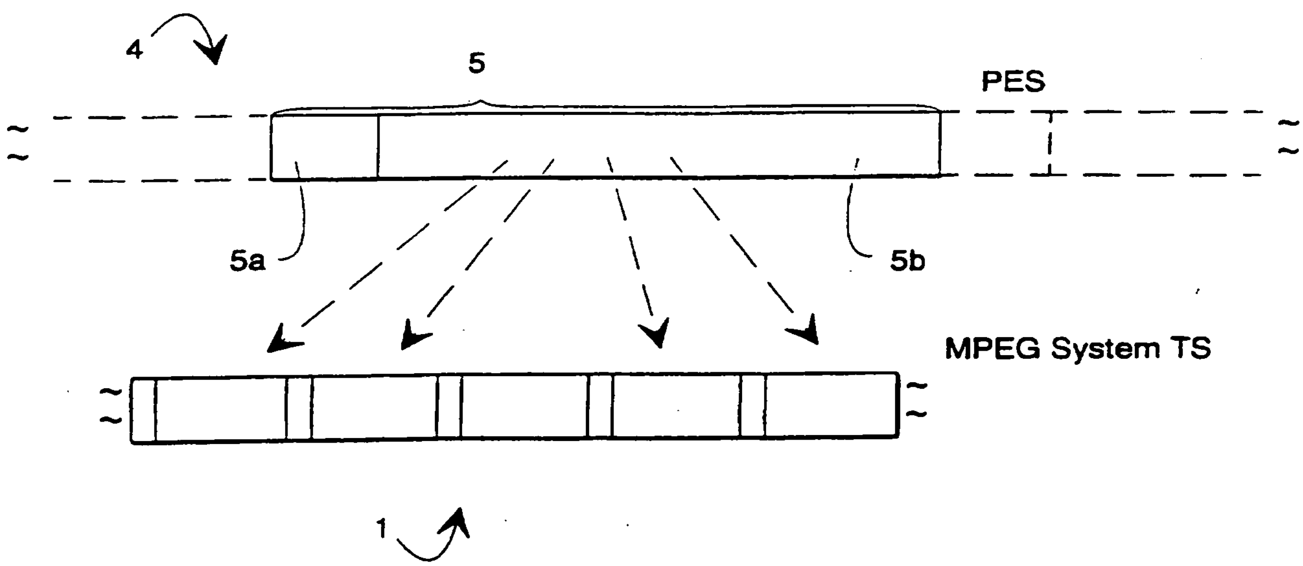

Fig. 2

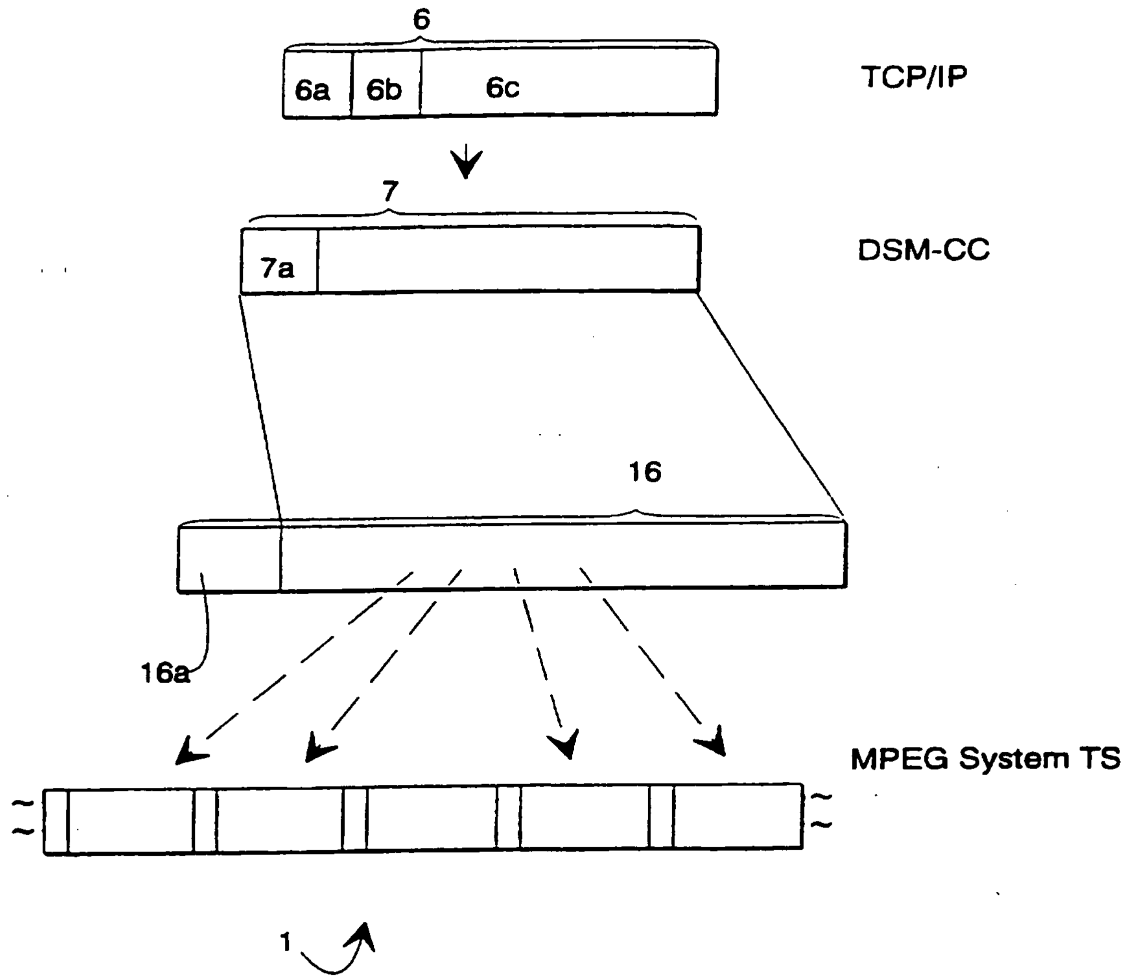

Fig. 3

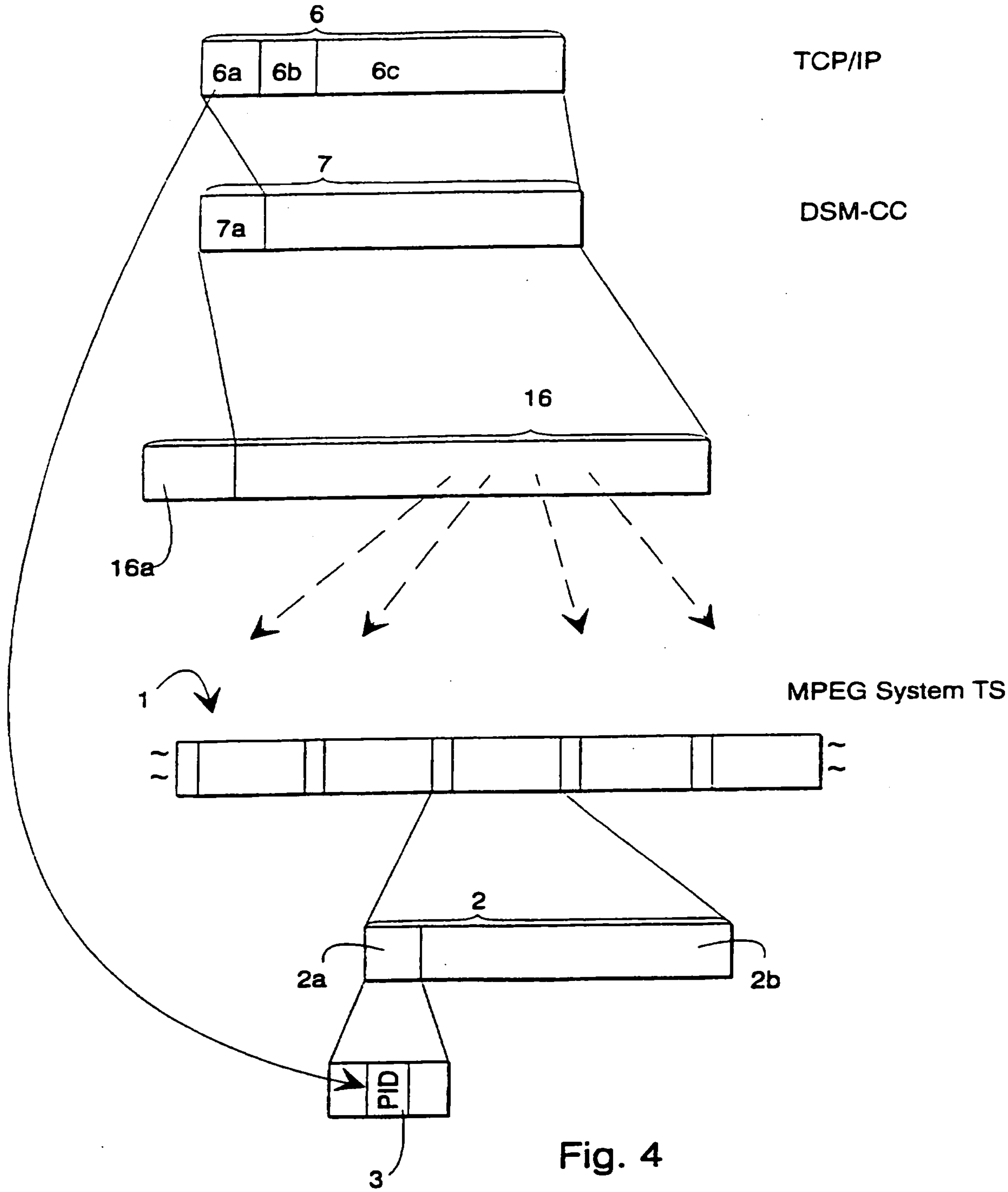

Fig. 4

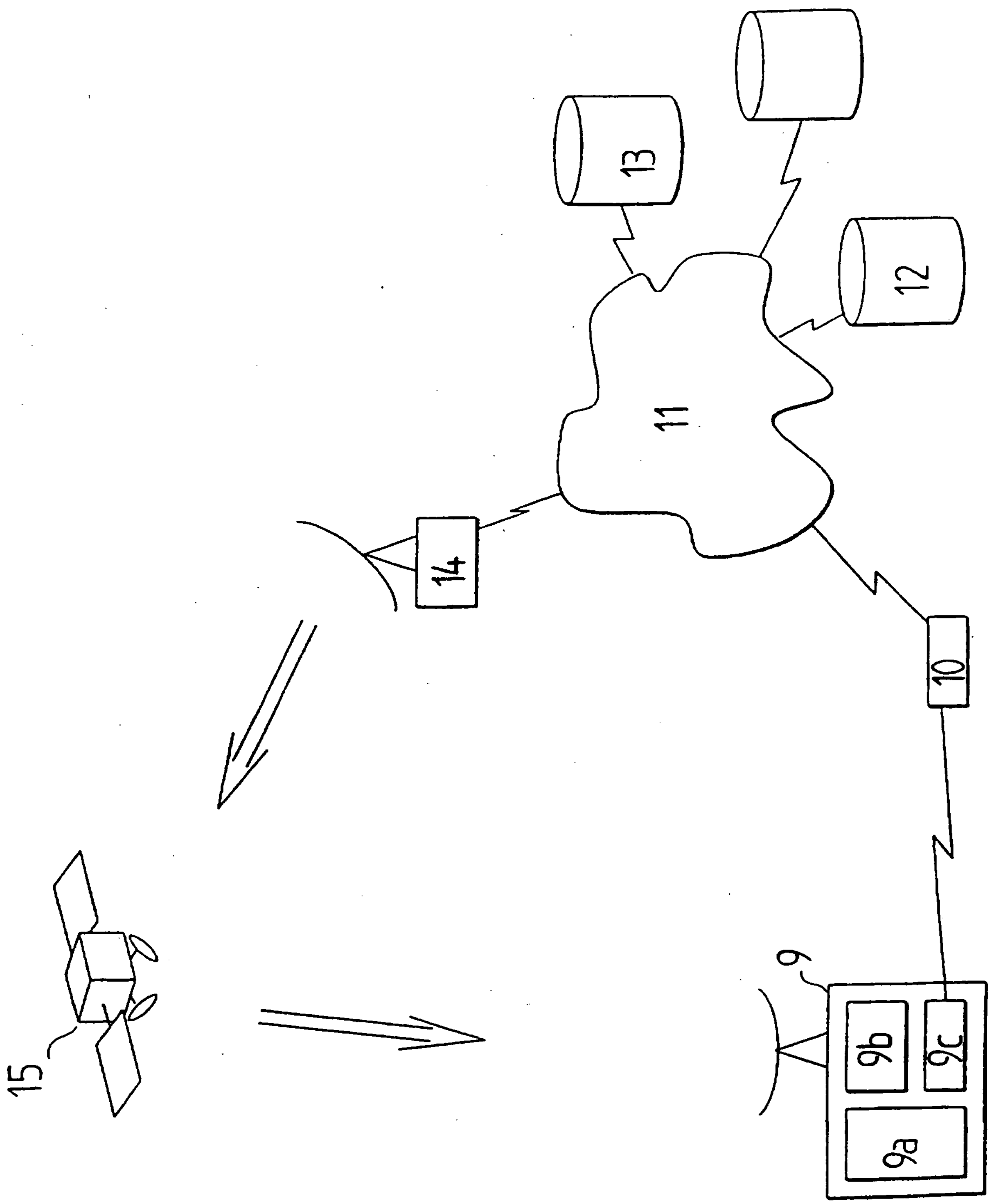

Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 96/00640

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H04L 12/56
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: H04L, H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	AIP Conference Proceedings, Volume, No 325, January 1995, (USA), Arora et al, "Hybrid Internet Access" page 69 - page 74	1-9
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P,X	WO 9534153 A1 (HUGHES AIRCRAFT COMPANY), 14 December 1995 (14.12.95), page 5, line 20 - page 10, line 9; page 11, line 11 - page 12, line 3	1-9
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X	EP 0624040 A2 (AT & T CORP), 9 November 1994 (09.11.94), column 3, line 9 - column 6, line 17	1,3-6,7,9
Y		2,8
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[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 April 1997	16.04.97

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 96/00640

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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